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| Title: The three different stages of matter: Solid, Liquid, and Gas |
| Subject: Science |
| Grade Level: Fourth Grade |
| Creator: Sherri Wade |
| Essential Question: What are the different stages of matter? |
| Standards:  Science  GLE.0407.9.2 Explore different types of physical changes in matter.  Checks for Understanding:  0407.9.1 Use appropriate tools to measure and compare the physical properties of various solids and liquids.  0407.9.2 Compare the causes and effects of various physical changes in matter.  SPI 0407.9.1 Choose an appropriate tool for measuring a specific physical property of matter.  SPI 0407.9.3 Interpret the causes and effects of a physical change in matter. |
| Thinking and Reasoning Skills:  Embedded Inquiry  GLE 0407.Inq.1 Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data.  GLE 0407.7 Organize data into appropriate tables, graphs, drawings, or diagrams.  Checks for Understanding:  0407.Inq.3 Maintain a science notebook that includes observations, data, diagrams, and explanations.  SPI 0407.Inq.1 Select an investigation that could be used to answer a specific question. |
| Integrated subjects:  RLA.O.4.2.2  Develop and apply the proper structure for simple and compound sentences.  Students will demonstrate proper sentences structure in journal responses. |
| Science Misconception/Incomplete Understanding: There are four states of matter. The fourth stage is called plasma. If you apply extreme heat to the gas stage, you will reach the plasma stage. The Sun is the plasma stage. A common misconception is blood plasma is the fourth stage of matter. Another misconception is that all solids have to be rigid and hard. Pourable solids are view as liquids and not solids. When water boils and bubbles, the bubbles are air, oxygen or hydrogen, or heat. It is not, the bubbles formed by boiling water consist of water vapor (steam). When steam (gas) is no longer visible it becomes air. When in fact water vapor (gas) condenses in the air it is visible as tiny water droplets. Water (liquid) in an open container is absorbed by the container, disappears, changes into air, or dries up and goes into the air. Water in an open container evaporates, changing from a liquid to a gas. |
| Materials: 20 oz plastic water bottle, white vinegar, baking soda, small balloon, plastic spoons, pencils, laboratory report, funnel/straw, safety glasses, **book,** and water. |
| Resources: Matter Lesson Plan, Assessment Rubric, Matter Changing Paper, Frayer Model, 3,2,1 Summarize, Balloon Blow-up, KWL chart, Laboratory Report, Alphaboxes, SWAT  www.acs.org/kids (American Chemical Society) This site can explains the science behind the [Balloon Blow Up](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS6.doc)investigation  “Matter: Vinegar & Baking Soda Balloon”. Retrieved from <http://www.superteacherideas.com/science7-matter.html> on 4-2-13. |
| Differentiated Instructions: Teacher can determine background knowledge informally through the use of a KWL chart. Teacher can provide direct instruction to students having difficulty distinguishing differences between solid, liquid, and gas. The 3-2-1 Summarize responses can be used to guide individual instruction. Groups will be created by the teacher taking into consideration student learning styles, personalities, work habits, background knowledge, and ability levels. Each group member must take on a specific role. For example, a student who is a strong writer might take notes for the group, while a student who enjoys public speaking might present the group’s findings. Each student will be responsible for the success of the group. All students will be expected to complete all investigations successfully. Peer assistance should be encouraged within the group. The teacher will act as a facilitator and offer direct instruction or additional time if needed. |
| Terms/Concept:  Liquid  Gas  Solid  Matter  Visible  Invisible  Temperature  Atom  Molecule  Student laboratory report will include vocabulary words, with definitions, entered into an [Alphabox](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS4.doc) as the words are introduced in each investigation.  Defined vocabulary will be added to a word wall.  Teacher can lead a game of [SWAT](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS17.doc) as a vocabulary review. |
| EngagementLaunch/Introduction: Introduce the different stages of matter using [Matter Changing Paper](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS8.doc)**.**  Introduce Kathleen Weidner Zoehfeld and Paul Meisel as the author of “What Is the World Made Of? All About Solids, Liquids, and Gases”. Read the story aloud the first time for enjoyment, reread looking for examples of solids, liquids, and gas changes and record on [Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc).  ***What Is the World Made Of? All About Solids, Liquids, and Gases*** by Kathleen Weidner Zoehfeld and Paul Meisel. |
| Exploration Lab:  Day 1 Whole Group Engagement  Teacher will introduce the different states of matter using the Matter [Changing Paper](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS8.doc)demonstration**.**  After the demonstration, students will complete the “Definition” and Characteristics” sections on a States of Matter [Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc)**.**  The teacher will introduce the author, Kathleen Weidner Zoehfeld and Paul Meisel , and the book hat Is the World Made Of? All About Solids, Liquids, and Gas the story to the students the first time for enjoyment then reread the story so that students can listen for examples of solids, liquids, and gases.  After the second reading, students will complete the “Examples” and “Non-examples” sections on a States of Matter [Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc)using items from the story.  Day 2 Whole Group Explanation  The teacher should go over basic safety procedures for the science investigations.  Review the Matter [Changing Paper](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS8.doc) demonstration, discussing the changes that were observed.  To demonstrate the power of the bubbles created through a chemical change, the teacher demonstrates the Balloon Blow-up experiment. Explain that a chemical reaction occurred between the baking soda, vinegar, and the water creating carbon dioxide. Discuss whether a new substance was created. (bubbles) Ask the students, What changes do you see? (bubbles, sound, gas) Discuss the creation of CO2, resulting in sound, bubbles, and gas. Ask students if they can think of any similar substances in their own life. Lead students to idea of the soda they drink.  Discuss what happened to the balloon.  What caused the balloon to rise?  Was there a physical or chemical change?  What two reactants came together?  After the change, was there a new substance? |
| Explanation: Students will check for understanding by use [3-2-1 Summarize](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS2.doc) as a daily debrief.  Follow up questions for students:  What is a solid?  What is a liquid?  What is a gas?  What are some characteristics that can help you determine if a solid and a liquid change has occurred? |
| Evaluation/Formative Assessment Task:KWL Chart,[Frayer Model](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS12.doc), [3-2-1 Summarize](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS2.doc), **Laboratory Report, and** [Assessment Rubric](http://wveis.k12.wv.us/teach21/cso/upload/UP3612WS5.doc) |
| **Expansion:** The concept of the different stages of matter can be further explored with investigations dealing with the creation of rock candy (sugar crystals).  Students can prepare, cook and eat the rock candy made in the classroom followed by a discussion of the changes observed as the sugar cooked. |
| **Teacher Notes:** Reflection questions for teacher:  How was inquiry experience received by my students?  Were the objectives clearly addressed?  Did I encouraging my children to listen and respond to the remarks of their peers, take risks, and ask critical questions in both large and small groups?  To what extent did my questioning foster critical and creative thinking?  Did I provide sufficient opportunity and time for the children to work independently, in pairs and in small groups?  Were my assessment techniques fair and appropriate for evaluating progress and understanding?  Did the inquiry lessons fit within the time allotment you had planned?  How did you feel throughout the inquiry experience?  Would you use this inquiry lesson again? If so what would you do differently? |